

Exploring Biomes

Lesson 4: Mapping Arizona

LESSON OVERVIEW

Just like the world, Arizona can be divided into biomes. Moreover, because we are working at a smaller scale, Arizona's biomes can be divided into smaller groups called biotic communities. In this lesson, students use a map to measure and compare the biotic communities of Arizona.

SUGGESTED GRADE LEVELS

- 6 – 10

ENDURING UNDERSTANDINGS

- At smaller scales, such as states, biomes can be divided into smaller, more specific groups called biotic communities
- Because of its wide range in elevations, Arizona has numerous biotic communities and is represented by almost all biomes

OBJECTIVES

Students will:

- Define what a biotic community is.
- Identify the biotic communities of Arizona.
- Use a scale map to estimate the area of the biotic communities of Arizona.

ARIZONA DEPARTMENT OF EDUCATION STANDARDS

Grade	Science	Mathematics	Technology
6	S1-C2-04; S1-C3-01; S1-C4-02; S1-C4-03	S1-C2-01; S1-C2-02; S1-C2-14; S1-C3-01; S2-C1-03; S2-C1-04; S4-C4-11	None
7	S1-C2-04; S1-C3-01; S1-C4-02; S1-C4-03	S1-C2-03; S1-C2-04; S1-C2-06; S1-C2-10; S1-C3-01; S1-C3-03; S2-C1-02; S2-C1-04; S2-C1-05	
8	S1-C2-04; S1-C3-01; S1-C4-03	S1-C2-01; S1-C2-02; S1-C3-01; S2-C1-04; S2-C1-05	
High School	S1-C3-06; S1-C4-02; S1-C4-04	S1-C2-01; S1-C2-02; S1-C3-01; S2-C1-02	None

Note: The full text of these standards can be found in Appendix A.



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TIME FRAME

- 1 – 2 days (45 minutes each day)

MATERIALS

- Computers with Internet access
- “Exploring Arizona’s Natural Resources” access (Web site or CD available from azgfd.gov)
- Rulers
- *Biotic Communities of Arizona* worksheet (one per student)
- *Biotic Communities of Arizona* map (one per student)

TEACHER PREPARATION

- Review the “Exploring Arizona’s Natural Resources” Web site or CD.
- Make a copy of the *Biotic Communities of Arizona* worksheet and map for each student.

SUGGESTED PROCEDURES

1. Ask students to name biomes that they think occur in Arizona. Solicit answers and discuss. Make sure students are aware that every biome except Tropical Rainforest and Savanna is found in Arizona.
2. Introduce the idea of scale. Since Arizona is smaller than the world, we can look at each biome in a little more detail. As a result, some of the biomes can be divided into smaller groups based on differences that are not as relevant at the large scale of the Earth. We will refer to these smaller groupings as biotic communities. Students will now have the opportunity to explore the biotic communities of Arizona.
3. Open the “Exploring Arizona’s Natural Resources” Web site or CD with students, and provide an overview. Show them that each biotic community they click on will provide some information about the community as well as some representative plants and animals found there.
4. Distribute rulers, the *Biotic Communities of Arizona* worksheet, and the *Biotic Communities of Arizona* map to the students. Inform them that they are to use the Web site/CD to answer the questions about each biotic community. Then, they must use the map and the ruler to calculate the approximate area of each of Arizona’s biotic communities. Emphasize that even though they will be estimating the area of each biotic community, they need to be as accurate as possible.
5. Allow the students time in class or at home to complete the worksheet.
6. Compare the students’ results. Discuss why they may have arrived at different answers. This is a good time to discuss estimation and accuracy.
7. Collect the *Biotic Communities of Arizona* worksheet.

ASSESSMENT

- Class discussion
- *Biotic Communities of Arizona* worksheet



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EXTENSIONS

- Students can compare the percentage of Arizona that is covered by each biotic community (or biome) to the percentage of the world that is covered by each biome.



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Appendix A: Arizona Department of Education Standards – Full Text

Science Standards

Grade	Strand	Concept	Performance Objective
6	1	2 – Scientific Testing (Investigating and Modeling)	4 – Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers)
		3 – Analysis and Conclusions	1 – Analyze data obtained in a scientific investigation to identify trends
		4 – Communication	2 – Display data collected from a controlled investigation 3 – Communicate the results of an investigation with appropriate use of qualitative and quantitative information
7	1	2 – Scientific Testing (Investigating and Modeling)	4 – Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers)
		3 – Analysis and Conclusions	1 – Analyze data obtained in a scientific investigation to identify trends
		4 – Communication	2 – Display data collected from a controlled investigation 3 – Communicate the results of an investigation with appropriate use of qualitative and quantitative information
8	1	2 – Scientific Testing (Investigating and Modeling)	4 – Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers)
		3 – Analysis and Conclusions	1 – Analyze data obtained in a scientific investigation to identify trends
		4 – Communication	3 – Present analyses and conclusions in clear, concise formats
High School	1	3 – Analysis and Conclusions	6 – Use descriptive statistics to analyze data, including: <ul style="list-style-type: none"> • mean • frequency • range
		4 – Communication	2 – Produce graphs that communicate data 4 – Support conclusions with logical scientific arguments



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Mathematics Standards

Grade	Strand	Concept	Performance Objective
6	1	2 – Numerical Operations	1 – Select the grade-level appropriate operation to solve word problems 2 – Solve word problems using grade-level appropriate operations and numbers 14 – Solve problems involving fractions or decimals (including money) in contextual situations
		3 – Estimation	1 – Solve grade-level appropriate problems using estimation
	2	1 – Data Analysis (Statistics)	3 – Interpret simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs 4 – Answer questions based on simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs
	4	4 – Measurement – Units of Measure – Geometric Objects	11 – Determine the actual measure of objects using a scale drawing or map
7	1	2 – Numerical Operations	3 – Select the grade-level appropriate operation to solve word problems 4 – Solve word problems using grade-level appropriate operations and numbers 6 – Divide integers 10 – Calculate the percent of a given number
		3 – Estimation	1 – Solve grade-level appropriate problems using estimation 3 – Determine whether an estimation of area is approximately equal to the actual measure
	2	1 – Data Analysis (Statistics)	2 – Construct a circle graph with appropriate labels and title from organized data 4 – Interpret data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs 5 – Answer questions based on data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs

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Mathematics Standards Continued

Grade	Strand	Concept	Performance Objective
8	1	2 – Numerical Operations	1 – Select the grade-level appropriate operation to solve word problems 2 – Solve word problems using grade-level appropriate operations and numbers
		3 – Estimation	1 – Solve grade-level appropriate problems using estimation
	2	1 – Data Analysis (Statistics)	4 – Interpret box-and-whisker plots, circle graphs, and scatter plots 5 – Answer questions based on box-and-whisker plots, circle graphs, and scatter plots
High School	1	2 – Numerical Operations	1 – Select the grade-level appropriate operation to solve word problems 2 – Solve word problems using grade-level appropriate operations and numbers 6 – Divide integers 10 – Calculate the percent of a given number
		3 – Estimation	1 – Solve grade-level appropriate problems using estimation
	2	1 – Data Analysis (Statistics)	2 – Organize collected data into an appropriate graphical representation



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Appendix B: Worksheets and Overheads

The pages that follow contain the worksheets listed below:

- A. *Biotic Communities of Arizona Worksheet* – A worksheet students use to estimate the area of each biotic community in Arizona and present their estimates on a circle graph (2 pages)
- B. *Biotic Communities of Arizona Map* – A map showing the size and locations of the various communities in Arizona (1 page)

